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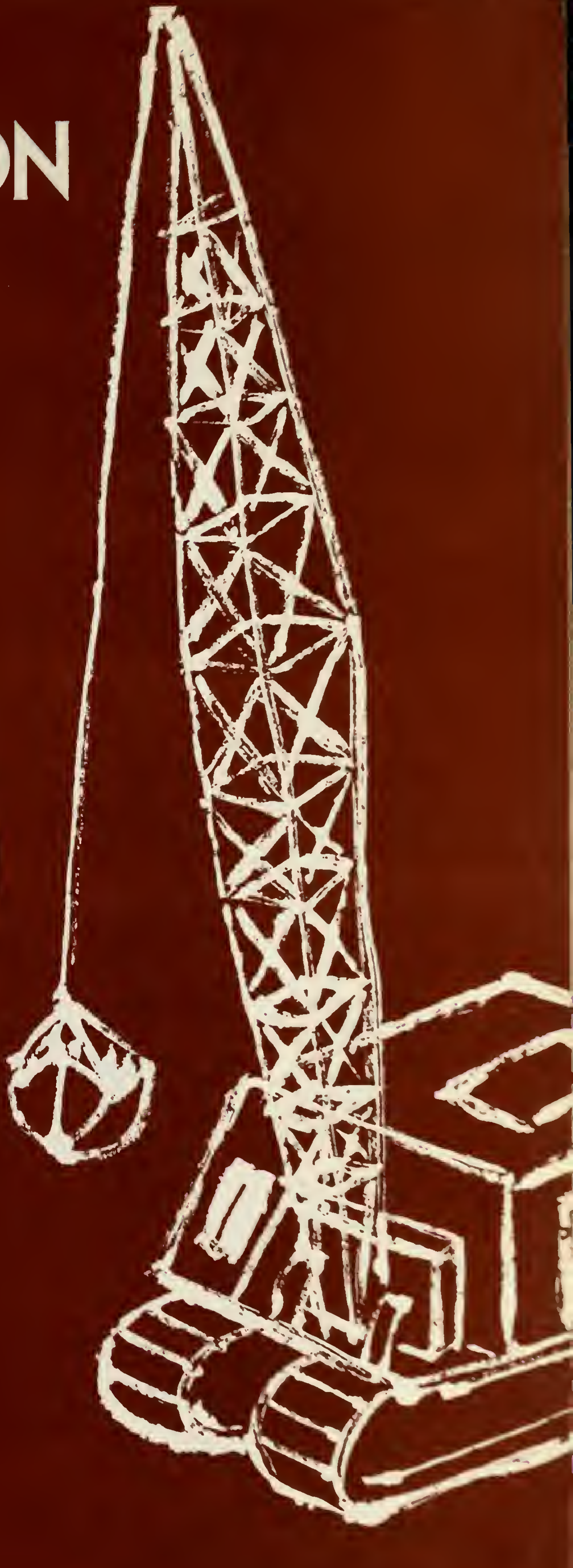
CONSTRUCTION EQUIPMENT

A MARKET ASSESSMENT FOR THE PEOPLE'S REPUBLIC OF CHINA



U.S. DEPARTMENT OF COMMERCE
Domestic and International
Business Administration

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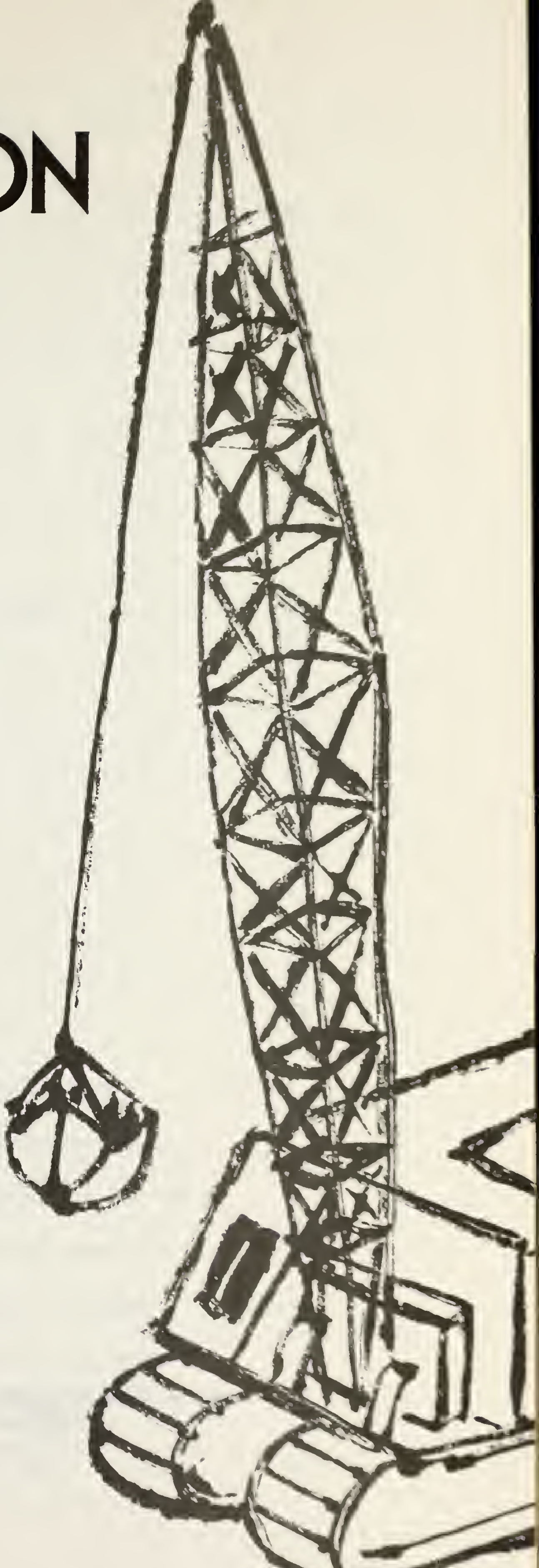

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March 1976

U. S. Depository Copy

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C., 20402 - Price 65 cents

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INTRODUCTION

Objectives

Since the late 1960's, there has been an increased awareness in the People's Republic of China (PRC) of the need for construction equipment. This has been reflected in the import of substantial amounts of such equipment and by rising domestic production. The number of construction projects planned or underway in various industries, as well as the stress placed on expanding industrial production throughout China, indicate that this trend is likely to continue. Clearly, the PRC has a growing need for many types of construction equipment.

The objectives of this market assessment are:

—To survey the construction equipment industry in China.

—To determine the size of the construction equipment market.

—To identify the types of construction equipment offering the best export potential for U.S. firms.

—To alert U.S. manufacturers of such equipment to the sales potential in China.

Scope

Types of construction equipment surveyed in the report are:

road rollers, self-propelled (SITC No. 7184.100)[1]

power cranes, etc., excavator types, crawler mounted, (SITC No. 7184.202–7184.206)

walking draglines and walking cranes, excavator type (SITC No. 7183.210)

power cranes, draglines and shovels, excavator type, backhoes and parts (SITC No. 7184.211–7184.216)

scrapers, dig-carry-haul (SITC No. 7184.220–7184.222)

motor graders and light maintainers (SITC No. 7184.224)

dredging machines, other than floating dredgers (SITC No. 7184.230)

ditchers and trenchers, self-propelled (SITC No. 7184.231–7184.233)

railway maintenance of way equipment (SITC No. 7184.234)

construction, maintenance, leveling, excavating machines, (SITC No. 7184.237–7184.239)

attachments for mounting on tractors, e.g., backhoes, dozer blades, rippers and rooters (SITC No. 7184.240–7184.248)

parts and accessories for construction, maintenance, leveling, excavating machines (SITC No. 7184.250)

concrete mixers and batchers (SITC No. 7185.-105)

bituminous mixers and batchers (SITC No. 7185-110)

parts for concrete mixers and batchers, bituminous mixers and batchers (SITC No. 7185.125)

air compressors and parts (SITC No. 7192.210–7192.225)

integral tractor-shovel loader, wheel type (SITC No. 7193.108-7193.120)

integral tractor-shovel loader, track-laying and parts (SITC No. 7193.122–7193.128)

front-end loaders, for mounting on tractors (SITC No. 7193.132)

parts and attachments, for lifting and loading machinery (SITC No. 7193.142)

concrete pavers, finishers and spreaders (SITC No. 7198.005)

bituminous pavers, finishers and spreaders (SITC No. 7198.010)

parts for concrete pavers, finishers and spreaders, bituminous pavers, finishers, and spreaders (SITC No. 7198.015)

trucks, truck chassis and truck tractors, gas and diesel over 10,000 lbs. (SITC No. 7320.212–7320.258)

power cranes, shovels, etc. (SITC No. 7320.310–7320.315)

special purpose non-military vehicles, new (SITC No. 7320.346) parts and accessories, for track-laying tractors, and off-highway tractors (SITC No. 7328.930)

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[1] Standard International Trade Classification. For conversion to Standard Industrial Classification (SIC), and to Schedule B numbers, see U.S. Department of Commerce, Bureau of the Census, *U.S. Foreign Trade Statistics, Classifications & Cross Classifications*, Washington, D.C., GPO, 1970.

dredges, non-military (SITC No. 7355.060)

The survey is limited to the larger types of construction equipment. Winches, hoists, tractors, 20 hp. and under, and smaller types of equipment are not covered in great detail since the smaller commodities are much more difficult to identify in trade data, Chinese press reports, and other source material.

Analysis

It is not possible to estimate the domestic production of construction equipment in China with any precision. Moreover, in the absence of five-year plan details it is very difficult to develop meaningful estimates of aggregate future demand for such equipment. The analysis of import potential developed in this report is based on the assumption that certain past relationships in the Chinese economy will continue in the future. Discussion of the methodology employed can be found in the section "Market Potential". Thus, if the reader does not agree with the assumptions contained in the study or if the Chinese make additional information available, the conclusions of this report can then be modified accordingly.

The time frame used in the report is 1975-1985. This covers the period of the long-range ten-year plan proposed by Chou En-lai at the Fourth National People's Congress. During this period China is to embark on a program of modernizing agriculture and industry as well as other sectors of the economy. According to Chou, "the next ten years are crucial" for building an independent industrial system. "With this objective in mind, the State Council will draw up a long-range ten-year plan, five-year plans and annual plans." Although no plan details are available it appears that the Chinese intend to follow a relatively aggressive industrial policy during this period.

Much of the data used in the study were derived from third country trade statistics, Chinese publications, press reports, trade journals, reports of businessmen and individual travelers to China, and other reports available to the U.S. Government.

In addition, several publications have been very useful in compiling the report. These include *Industrial Development in China,* by Nai-Ruenn Chen, U.S. Department of Commerce. Bureau of East-West Trade. October 1974; *Capital Formation in Mainland China, 1952-1965,* by Kang-Chao, University of California Press, Berkeley, California, 1974; *China: A Reassessment of the Economy,* U.S. Senate, Joint Economic Committee, Washington, D.C., GPO, 1975.

While the report contains obvious deficiencies it is presented in the belief that the information contained herein will be useful to those concerned with the sale of American construction equipment to the PRC.

CONCLUSIONS

During the next 10 years, China's demand for construction equipment will increase at an annual rate of 8 to 10% if projected rates of industrial growth are realized. Although domestic production will also expand, it is unlikely that it will be sufficient to meet the demand. Imports of construction machinery will make up the difference.

In the 25 years since its establishment, the People's Republic of China has made significant advances in the production of construction equipment. It began in 1949 with a small park of construction equipment and the heavy industrial base essential to the production of such equipment badly war-damaged. The PRC now can boast of domestically manufactured construction machinery of almost every type, from simple road rollers to large cranes and dredgers.

Although the various types of Chinese construction equipment currently produced are impressive in view of China's earlier economic situation, there is a definite technological lag between its machinery and that produced by the leading industrialized countries. For example, the largest bulldozer serially produced in the PRC is a 12-ton,[1] 160 hp. model similar to the Caterpillar D-7 of 1945 vintage. The most recently produced dump truck, the Shanghai SH–380, has a payload of 32 tons. While it is an improvement over its predecessor, the 15-ton SH—361 dump truck, it is still small when compared to the 100 and 200-ton off-highway trucks manufactured in the United States. Similar differences between Chinese and Western construction equipment occur generally in such types of machinery as concrete mixers, compressors, cranes, power shovels, draglines, dredgers, shovel loaders, graders, road rollers, compactors, and spreaders. Very large machines are rarely produced on a serial basis, but rather, are manufactured for a specific job.

In the period 1975-1985, as the Chinese construction equipment industry continues to expand, it will have to solve problems in the areas of hydraulics, metallurgy, and machine tools before serial production of the larger types of equipment is initiated. All types of equipment need to be produced in larger quantities and trial production of more efficient machines must be begun.

In spite of growth in domestic production, it is estimated that China's imports of construction machinery will also expand 8 to 10% annually for the next 10 years. Such a growth rate indicates that by 1985 the PRC will be purchasing annually $60 to $75 million of construction machinery, including trucks. Between 1966 and 1974, it is estimated that imports of this equipment averaged $25 to $28 million annually.

Chinese demand for foreign construction machinery will likely focus on bulldozers, shovel loaders, power shovels of the 8 to 15 yd. size, hydraulic truck cranes, pipelayers and off-highway trucks of 80 to 200-ton capacity. Sales potential also exists for motorgraders, scrapers, and road rollers although the extent of this potential depends largely on the future development of China's road-building program. Until China develops the capability to produce parts for these machines, a market for parts also will exist. To date the Chinese have shown no interest in purchasing plants for the manufacture of construction equipment.

Several major variables could, of course, alter this assessment. The official goal for industrial growth may be too optimistic and the necessary foreign exchange to pay for imports may be insufficient given China's recent balance of payments difficulties. Changes in China's domestic and international political situation also could affect China's buying patterns. The following section discusses these problems in greater detail. While this report assumes a continuation of the current official policy, businessmen should be alert to these factors, as they have in the past significantly influenced China's import policies.

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[1] Both the English and metric systems are used in this report. Measures of length are given in the English system with metric equivalents. The word "ton" refers to a metric ton. The tables use metric units of measure.

CONSTRUCTION EQUIPMENT MARKET ANALYSIS

Import Policy

Chairman Mao has said, "build our country independently and with the initiative in our own hands, through self-reliance, hard struggle, diligence, and thrift." However, the Chinese policy of self-reliance allows imports of essential equipment and technology. As the Minister of Foreign Trade said in 1974, "China welcomes technical interchange with other countries and imports essential equipment on a planned and selective basis according to the needs of her socialist construction."

Although there is some opposition in China to foreign imports, Chinese authorities have made it clear that China's continuing policy calls for the import of some foreign technology and equipment. The China Council for the Promotion of International Trade argues that technological imports would even be conducive to self-reliance. In a recent publication the Council states: "China imports some new equipment and technology that are needed in carrying out the policy of being more self-reliant and speeding up the building of socialism."

Market Potential

Over the next 10 years demand for construction equipment is expected to grow with emphasis on the expansion of domestic production to meet requirements. The supply of such equipment, however, will be unable to keep pace with demand. Therefore, if Chinese plan targets are to be met, the gap will have to be filled by increased imports of construction machinery.

Several key assumptions, derived from a study of past interrelationships within the Chinese economy, form the basis for this conclusion:

(1) China's industrial growth during the period 1975 through 1985 will be between 8 and 10% annually.

(2) Fixed capital investment and construction activity, which is an important component of the former, will record a similar increase during this period.

(3) Contruction equipment imports will expand at approximately the same rate as both of the above, that is at 8 to 10% annually.

A historical survey of China's industrial output, fixed capital investment, and construction activity for the past 25 years indicates that during the period 1949 through 1974, these three economic indicators have closely followed the same general pattern. In periods of industrial growth, for example the 1950's and mid-60's, investment in plant and equipment and in construction activity expanded. Similarly, a decline in economic activity, as in the early 1960's and during the Cultural Revolution, was accompanied by a drop in construction activity and an even greater decline in investment. These relationships are illustrated in Figure 1.

In view of China's 8% annual industrial growth during the past 10 years, a growth rate of at least 8 to 10% for the period 1975-1985 does not seem unreasonable. Supporting evidence for such a rate is found in Hupeh Province's recently announced industrial output target of 15% annually through 1980, as well as the 9 to 10% industrial growth recorded by Peking for the first half of 1975. An 8 to 10% growth in construction activity is supported by an increased emphasis on such activities as port development, major water conservancy projects, pipelines, transportation and communication developments, and large scale industrial construction.

Evidence that China intends to pursue a relatively aggressive industrial policy during the period 1975-1985 is indicated by Chou En-lai's statement at the Fourth National People's Congress in January 1975. According to Chou, China's national goal for economic development is to "build an independent and relatively comprehensive industrial and economic system . . . before 1980" and "to accomplish the comprehensive modernization of agriculture, industry, national defense, and science and technology before the end of the century . . ."

The pattern of China's construction and mining equipment import activity since 1961 is presented in Figure 2. Table 1 lists the value of China's construction equipment imports since 1966, excluding trucks and truck cranes. A comparison of Figures 1 and 2 with Table 1 shows that since 1961 a contraction of industrial and investment activity generally led to a downward shift in imports. An increase in fixed investment, construction activity and industrial output was accompanied by a similar upward movement in imports.[1] This suggests that during periods of in-

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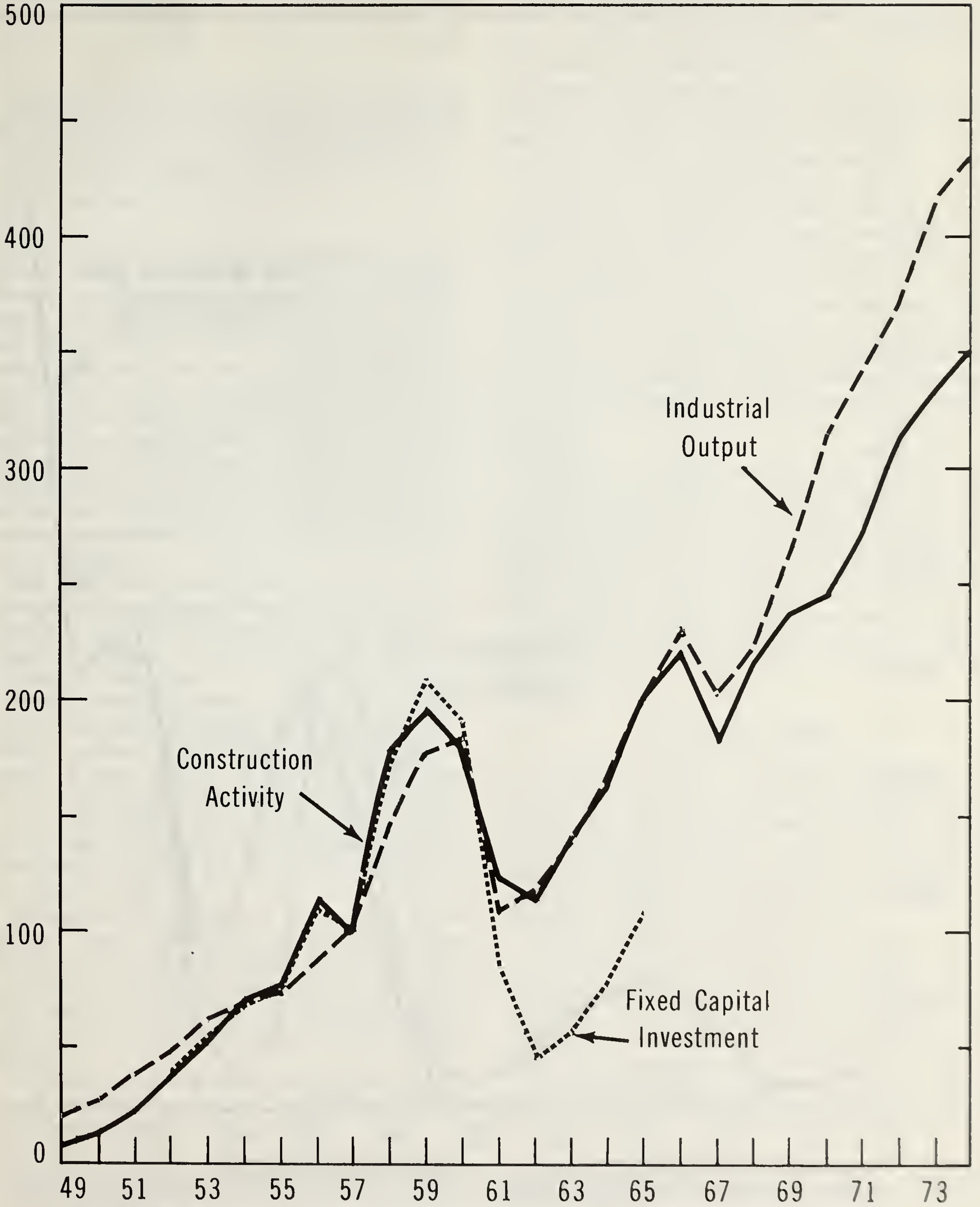
[1] The period 1972 to 1973, when imports of construction and mining equipment declined in spite of a rise in the three economic indicators of Table 1, appears to be an exception. The decline may reflect the lag between signing of contracts and actual delivery of goods or the increased purchase of transport equipment during the period 1972 to 1973 when China contracted for large numbers of aircraft and cargo ships. The priority given such imports during this period may have necessitated a cutback of construction and mining equipment. This was apparently a short-term development as indicated by the upturn recorded in 1974 and estimated for 1975.

Figure 1

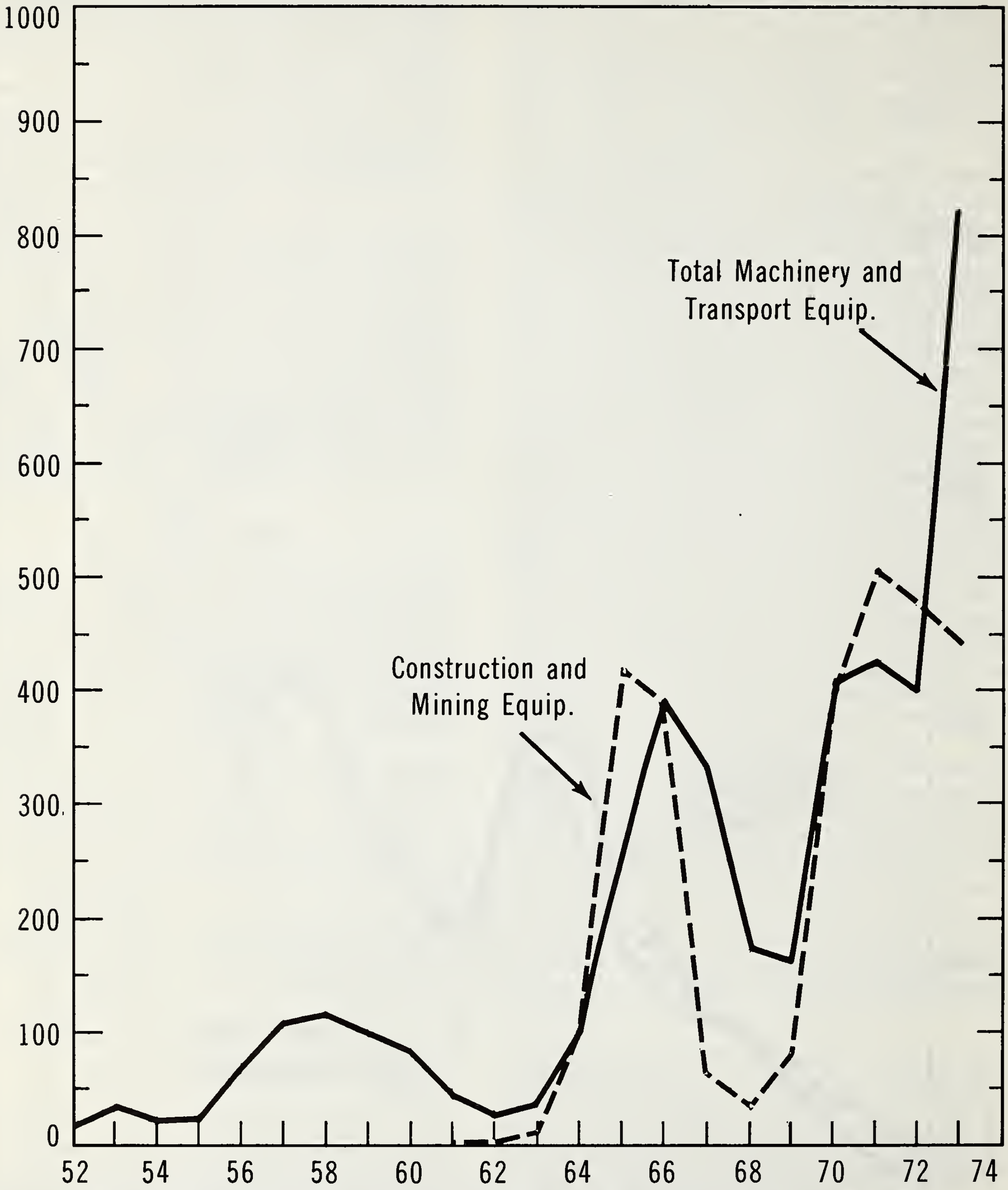
Index of Industrial Output, Fixed Capital Investment, and Construction Activity



Source: China: A Reassessment of the Economy, U.S. Senate, Joint Economic Committee, Washington, D.C. GPO, 1975.

Figure 2

Index of PRC Imports of Total Machinery and Transport Equipment and Construction and Mining Equipment from Non-Communist Countries



[1]Construction and Mining Equipment is a subcategory contained within the more broadly defined category of Total Machinery and Transport Equipment.

[2]Prior to 1961, hoisting and conveying equipment were included in the Construction and Mining Equipment category.

Table 1.—Value of PRC Construction Equipment Imports (1966-1974)[1]

1966	6.4
1967	1.9
1968	1.9
1969	3.6
1970	14.7
1971	12.7
1972	8.7
1973	2.7
1974 [2]	48.6

[1] Values are understated because of inability to separate imports of truck cranes and trucks for construction purposes from those for cargo transport and other uses. As a result, specific yearly totals of all construction equipment are not available although it is estimated that in this period they averaged $25 to 28 million annually.

[2] Based on partial 1974 data from Japan, Sweden, and West Germany.

NOTE: Values given in current prices.

creased investment in plant and equipment, there was still a gap between the amount of equipment produced in China and the amount needed. In these instances, imports increased to make up the difference. China appears to be becoming more self-reliant over time, but has not reached the stage where she is capable of fulfilling her own construction equipment needs. The 1974 and 1975 data plus indications of ongoing Chinese contract discussions support the conclusion that this relationship continues to date. Thus, past performance indicates that an increase of 8 to 10% in industrial output will mean a corresponding rise in imports of construction equipment.

The point could be made that in view of China's current foreign exchange difficulties, this is an overly optimistic estimate. However, recent developments suggest that China's current foreign exchange problems may be temporary.

China's petroleum industry, a large export-earning industry, is expanding rapidly. PRC petroleum production, estimated at 80 million tons in 1975, is expected to grow annually by about 20% through 1980. Chinese exports of crude reached 10 million tons in 1975 earning more than $700 million. Earnings derived from the sale of petroleum and petroleum related products will likely be substantial in the years to come.

Another source of funds will be developed by the fertilizer plants purchased recently. When these plants begin operations during the next 5 years, they will enhance China's agricultural productivity, and hence reduce requirements for fertilizer imports. This will free more funds for use on other commodities.[2]

Over the past several years, the Chinese have purchased plant and equipment using "deferred payments," a form of medium-term credit. The continued use of such credit to finance a temporary imbalance in foreign trade will allow additional purchases of equipment.

Since 1966 Chinese purchases of construction equipment, including trucks, have averaged $25 to $28 million annually. Expansion of these imports at an 8 to 10% level would mean that by 1985 China would be purchasing $60 to $75 million (in 1975 dollars) of this machinery each year. Such a projection is perhaps an optimistic one since it assumes that agricultural conditions will at least remain stable and Chinese foreign trade and national plan policies will undergo no significant changes.

In view of China's past purchases and the kinds of construction projects currently underway and planned (see "Construction Activity"), the types of construction machinery with the highest potential for the China market during the next 5 to 10 years are bulldozers, shovel loaders, power shovels of the 8 to 15 yd. size, hydraulic truck cranes, pipelayers, and dump trucks of 80 to 200-ton capacity. Sales of motorgraders, scrapers, and road rollers also appear promising although their future importance is largely dependent on the success of China's road-building program.

American manufacturers of machinery for the construction industry are among the most competitive in the world. Given the potential for sales of such equipment to the PRC, and the considerable length of time often required to successfully sell to the Chinese, American firms should explore the China market now. Since 1973, American companies have sold over $30 million of construction equipment, including power shovels, 120-ton trucks, and pipelayers.

Construction Activity*

In 1949, the Chinese government inherited an industrial base which had been badly damaged during the war. To reconstruct this base, the First Five-Year Plan (1953-57) accorded priority to construction and development of major industries; substantial amounts of plant and equipment were purchased from the U.S.S.R. and Eastern Europe.

In the late 1950's the Chinese attempted to hasten industrial growth by adding massive inputs of labor to the construction process. This Great Leap Forward was characterized by a shift in emphasis from construction of large projects to development of small, local industries such as "backyard" blast furnaces, cement plants, fertilizer plants, and small power stations. The resultant shortages of materials and food brought about the collapse of the Great Leap Forward.

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[2] For a more comprehensive discussion of this topic, see *Industrial Development in China* by Nai-Ruenn Chen, October 1974, available from the Bureau of East-West Trade, U.S. Department of Commerce, Washington, D.C. 20230.

* For a more detailed discussion of this topic, see Ian MacFarlane, "Construction Trends in China, 1949-74" in *China: A Reassessment of the Economy*, U.S. Senate, Joint Economic Committee, Washington, D.C., GPO, 1975.

The early part of 1960 saw the beginning of a higher investment priority accorded to agriculture and industries supporting agriculture. This priority has dominated the Chinese economic scene ever since. As a consequence, domestic production of larger type bulldozers was initiated for water conservation programs, road construction etc.

During this same period, the Sino-Soviet rift and ensuing withdrawal of Soviet aid caused the Chinese to turn to the West and Japan as a source of plant and equipment. Some of the machinery purchased was construction-related as China again focussed on major projects in petroleum, petrochemicals, steel, and certain other industrial sectors.

The Cultural Revolution (1966-69) also disrupted domestic construction activity and the production of construction equipment. Imports were reduced. However, since 1969 work has moved forward on large projects in the areas of transportation and communications, mining, agriculture, and large plant construction. Indications are that this trend will continue for the near future.

In the transportation and communications sector, capital construction has been largely devoted to rail and road building and port improvement.

Railroad development has been an area of concern to the Chinese since the founding of the People's Republic. Total railway mileage increased from 13,200 miles (22,000 km.) in 1949 to 26,400 miles (44,000 km.) in 1974. When double-tracking, freight lines, and forest and local track of non-standard gauge are taken into account, the total is nearly doubled.

Since 1971, two major trunk lines have been finished. The Hunan-Kweichow railway, 379 miles long (632 km.), was completed in 1972 and forms the east-west trunk line south of the Yangtze. The Chengtu-Kunming railway, completed in 1974, is 651 miles long (1,085 km.) and forms the north-south trunk line in southwest China. Construction is currently underway on two more major lines. One in western China will extend for 1,600 miles (2,560 km.) and the southern line will be 800 to 900 miles (1,200 to 1,400 km.) long. Minor lines also are being expanded since the PRC embarked on a program in 1972 of developing short-run railways. Construction also is underway on industrial spurs, rail yards and transfer facilities, and repair depots.

At the present time, numerous railroad construction divisions of the People's Liberation Army (PLA) are engaged in full time rail construction. This indicates the importance attached to this area of China's transportation sector.

Highway improvement likewise has enjoyed substantial growth since 1949. By the end of 1971, the PRC had more than 400,000 miles (670,000 km.) of roads, 90% of which had been built since the establishment of the People's Republic. Nine trunk highways were built in 1974 alone. In addition to construction of new highways and short-distance roads to communes and rural counties, some existing 7,800 miles (13,000 km.) of roads were improved by asphalt paving in 1974. In spite of these efforts, however, only a fraction of all roads in China are bituminous-treated.

As China continues its efforts to enhance its internal transportation and communications capabilities, the needs of the road building industry will receive close attention.

Unlike rail and road construction, port expansion generated little interest until very recently. It is only within the past 3 years that China has recognized the necessity of modernizing its ports in order to keep pace with its burgeoning petroleum industry and its rapidly expanding foreign trade. Twice as much port construction was done along China's coast during 1974 as in 1973. This included the addition of at least 12 new berths.

Harbor improvements are planned for nine major ports along China's coast; five are being improved to upgrade petroleum transport facilities. Many of the projects involve construction of roads and railways as well as warehouses and oil storage tanks. Included in these plans are developments at the port of Ch'in-huang-tao, Talien and Huang-tao in the northeast and Chan-chiang in the south.

Ch'in-huang-tao presently has three piers and is capable of accommodating ships up to 35,000 tons (DWT). The channel at Chan-chiang is being dredged to a depth of 50 feet enabling tankers of 70,000 tons to call.

Port construction in recent years has also been directed toward development of containerization-related facilities, e.g. at Hsinkang and Shanghai. The Chinese recently announced that Hsinkang is equipped to handle containerized shipments.

Pipeline construction to bring crude to the ports has proceeded apace with port developments. The Chinese have already constructed several major oil transmission lines. One from Taching to the harbor at Ch'in-huang-tao and on to Peking is 908 miles (1507 km.) long with a diameter of 24 inches while a parallel line from Taching to T'ieh-ling in Liaoning Province was completed in September 1974; this line is being extended to Talien. Still another line connects the Sheng-li oil field in Shantung province to the port of Tsingtao. Other lines are planned or under construction.

In addition to petroleum, development of other natural resources is also being promoted. Many of these, namely coal, copper and iron ore, are mined using open pit techniques. Large scale expansion of such operations necessitates use of shovels, drag lines, bulldozers, dump trucks, and other construction machinery.

Also significantly affecting Chinese construction activity over the next 5 years is the construction of the many complete plants purchased by the PRC since 1972. Most of the more than 30 complete plants contracted for are scheduled for completion before 1980. All of them are important to China's economic growth, either as producers of petrochemicals, chemical fertilizer for agriculture, or as suppliers of steel or electric power for all sectors of the economy.

Although it is possible that foreign equipment will be used on many of these projects, such information is not available. Unlike the U.S.S.R. and many Eastern European countries, China does not publicize its use of foreign equipment on specific construction projects.
meet demand is supplied by domestic production.

Purchases Abroad

The bulk of construction equipment needed to However, in technologically advanced areas and for very large equipment China still relies on imports.

China purchases construction machinery from the Soviet Union, Eastern Europe (mainly Poland) and five or six western countries, namely France, the U.K., West Germany, Sweden, Finland and Japan. Tables 2 and 3 show construction equipment excluding trucks and truck cranes exported from these latter nations to the PRC in the period 1970-1974. Japan is the major source of imports of construction equipment accounting for 75% of total purchases ($19 to 21 million); the U.S.S.R. and Eastern Europe account for 10 to 15% ($3 to 4 million), and the remaining 10 to 15% ($3 to 4 million) is obtained from the other countries.

Japan's share of the Chinese construction equipment market need not discourage potential exporters. The Japanese have been trading with China since the 1960's whereas American firms have only recently entered the picture. The proximity of Japan to China and the corresponding saving in transportation costs that this implies also play a role in this market share. The same is true of the Sino-Japanese

Table 2.—PRC Imports of Construction Equipment from Japan [1]
(in 1000s of U.S. Dollars)

		1975 (Jan.-Sept.)		1974		1973		1972		1971		1970		Total	
SITC No.	Category	No.	Val.	No.	Val.	No.	Val.	No.	Val.	No.	Val.	No.	Val.	No.	Val.
7125 30	Track Laying Type Tractors	319	8,254	1,057	28,221	30	674	205	4,004	6	87	150	2,340	1,767	43,580
7184 11–13	Road Rollers . .	2	13	—	—	6	65	—	—	—	—	3	25	11	103
7184 14	Parts	—	—	NA*	2	—	—	—	—	—	—	NA	1	NA	3
7184 21	Excavators	9	524	168	6,091	12	404	2	30	2	47	7	143	200	7,239
7184 24	Graders	21	487	7	124	8	127	11	156	6	80	10	130	63	1,104
7184 25	Bulldozers[2] . . .	272	503	1,033	2,448	30	58	209	567	56	814	312	3,434	1,912	7,824
7184 27	Rock Drills (not pneumatic)	—	—	—	—	214	89	3	1	—	—	300	104	517	194
7184 28	Scrapers	—	—	—	—	—	—	—	—	—	—	5	50	5	50
7184 29	Excavat. level, tamp., bor., extract. mach., n.e.s.**	42	1,882	274	4,652	34	449	142	3,777	58	6,606	254	3,316	805	20,682
7184 30	Parts for 7184 29	NA	1,659	NA	1,282	NA	260	NA	28	NA	339	NA	609	NA	4,177
7185 30	Mach. for agglom., mould., shap. minerals, cement and parts thereof.	NA	67	NA	330	NA	63	—	—	—	—	—	—	NA	460
7193 12	Cranes, n.e.s. . .	20	2,674	16	3,644	—	—	—	—	85	3,495	38	1,244	159	11,057
7193 13	Parts of Cranes	NA	1,147	NA	287	NA	27	—	—	NA	28	NA	86	NA	1,575
	Construction Equipment Totals	686	17,210	2,555	47,081	334	2,216	572	8,563	213	11,496	1,079	11,482	5,439	98,048

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[1] Data derived from Japan's foreign trade yearbook. Trucks not included. Truck cranes may be included in category 719312.

[2] This refers only to the front blade of the bulldozer which is normally packed and shipped separately from the main body of the tractor (SITC No. 7125 30).

* NA—Not available.

** n.e.s.—Not elsewhere specified.

Table 3.—PRC Construction Equipment Imports from Selected Countries (1970-1974) [1]
(in 1000s of U.S. Dollars)

BTN* No. and Commodity by Country	1974	1973	1972	1971	1970	Total
FRANCE						
840910–30 Road Rollers	—	—	17	9	—	26
842311–1 Excavators, less than 160 tons (Crawler type)	114	—	—	—	130	244
842311–2 Excavators, less than 160 tons (Wheel type)	—	—	—	932	1,995	2,927
842313–1 Dozers (Crawler)	—	—	—	36	837	873
842318 Parts for Excavating Equipment	829	210	—	194	157	1,390
Total	943	210	17	1,171	3,119	5,460
SWEDEN						
8409100 Road Rollers	—	—	—	30	—	30
8422502 Cranes for mounting on trucks	—	—	9	—	—	9
8422804 Shovel Loaders (Wheel type)	403	—	71	—	—	474
8422900 Lift. and Load. Equipment Parts	25	—	55	35	—	115
Total	428	—	135	65	—	628
WEST GERMANY						
842351 Shovel Loaders (Wheel type)	—	138.5	—	—	—	138.5
842395 Parts for excavators, loaders and other construction equipment	15	16.6	—	—	93	124.6
842290 Parts for cranes and other lifting equipment	92	129.1	—	—	11	232.1
Total	107	284.2	—	—	104	495.2
Total for three countries:	1,478 [2]	494.2	152	1,236	3,223	6,583.2

* Brussels Tariff Nomenclature

[1] Data derived from individual country trade yearbooks. Trucks and truck cranes not included in figures. France, Sweden and West Germany are the most important West European suppliers of construction equipment to the PRC.

[2] Total figure for 1974 is preliminary because data for Sweden covers only the first 8 months of 1974.

political relationship where full diplomatic recognition exists. While Japan may remain China's major supplier of this equipment, none of the factors mentioned above necessarily precludes U.S. firms from entering and succeeding in the Chinese construction equipment market. As mentioned earlier, several American firms in fact have successfully concluded substantial contracts with China. The Chinese are shrewd businessmen and ultimately base their purchasing decisions on the quality and price of the goods involved.

Bulldozers, dump trucks, and truck cranes have dominated the Chinese construction equipment import picture. Since 1970, the PRC has contracted for over 1,500 mobile cranes from its major suppliers—Japan and the U.K. Of this total 70% consisted of truck cranes, over 250 of which were hydraulically operated. Most of the cranes were in the 15 to 40 ton range, although machines of up to 140-ton capacity were represented in the orders.

Between 1971 and 1973, China purchased approximately 7,000 heavy duty (over 6 tons) trucks. Japanese firms, foremost among them Isuzu, Toyota, Hino, Mitsubishi, and Nissan, supplied most of these. The remainder came from France (Berliet), Italy (Unic-Fiat and Perlini), and Sweden (Saab-Scania). Of the dump trucks contracted for, all but a very few were in the 8 to 40-ton range. However, initial sales of 14 120-ton U.S. off-highway trucks have been concluded.

Substantial orders have been placed for other types of construction machinery, including graders, scrapers, loaders and power shovels from Japan, France, and Sweden in the period 1970-1974. The latter machines were either of the small variety ½ to 2½ yd. shovels, or of the larger, 4 to 15 yd., capacity, suitable for mining.

Road rollers, pipelayers, compressors and other miscellaneous construction machinery comprised the remainder of Chinese imports of these commodities.

Table 4 presents known specific Chinese purchases of major types of construction equipment during the period 1970-75. Some of these purchases are included in the data presented in Tables 2 and 3.

Preliminary figures suggest that while sales of trucks were down from more than 16,000 in 1973

Table 4.—Selected Examples of PRC Construction Equipment Purchases (1970-1974)

Product	*Quantity*	*Date; Company; Other Remarks*
Angledozers (Model D80A-12)		1973. Komatsu. 12 of these have been imported annually since 1965.
Bulldozers and parts (16 to 33-ton)	1,192	1972. Komatsu. Valued at $43.8 million. Scheduled for delivery by January 1975.
Bulldozers (Model D155A-1)		1973. Komatsu. One of these has been imported annually since 1965.
Compressors (air)	195	1972. Mikuni (Japan)
Compressors (air)	8	1972. Six purchased from Tanabe and two from Hitachi.
Cranes (hydraulic 6-ton mobile)	87	1973. Ransomes & Rapier (UK) $2.4 million.
Cranes (hydraulic mobile)	14	1972. Kato
Cranes (hydraulic mobile)	6	1972. Tadano
Cranes (truck cranes)	24	1973. Kobe Steel Works.
Cranes (crawler cranes)	42	With 82 shovels, formed part of a $9.3 million package.
Cranes (truck cranes)		1974. Kato. Valued at $24,339.
Cranes (hydraulic 12-ton mobile)	140	1974. Coles (UK). Valued at $4.6 million.
Dredgers	44	1972-1973. IHC-Holland. Over $100 million worth of dredgers, including trailing-suction and cutter-suction dreggers, were sold to China during this period.
Loaders	63	1972. Toyo
Loaders (wheeled tractor shovels)	146	1973. Toyo. With 769 forklifts, formed part of $8 million package.
Loaders (Model BM1641) and dumpers (Model DR-860)	10	1974. Volvo. Valued at $1 million.
Loaders (BM Models 640/641 and 840/845)	5	1972. Volvo. No value given.
Pipelayers (Wire-operated, 70-ton steel pipe lift capacity)	12	1974. Komatsu. Additional orders expected.
Pipelayers (Medium-Size)		1975. Caterpillar. Valued at $3.8 million.

Table 4.—Selected Examples of PRC Construction Equipment Purchases (1970-1974)—(Cont'd.)

Product	*Quantity*	*Date; Company; Other Remarks*
Power Shovels	7	1973. Bucyrus-Erie. With 25 blast hole drills, formed part of $20 million package.
Power Shovels	4	1974. Hernault-Somua (Fr.) Valued at $2.1 million.
Trucks (8-ton)	100	1972. Isuzu. No value given.
Trucks (Tatra)		1973. Czechoslovakia. Valued at $75,000.
Trucks (heavy-duty)	1,060	1973. Unic-Fiat (Italy). Valued at $26.1 million.
Trucks (8-ton dump trucks)	3,020	1973. Isuzu. Valued at $23 million.
Trucks (12-ton)	400	1973. Hino. Valued at $4.8 million.
Trucks (20-ton dump trucks)	700	1973. Perlini. No value given.
Trucks (heavy-duty)	500	1973. Saab-Scania. Valued at $12.5 million. To be used for transporting timber.
Trucks (8, 10 and 12-ton)	412	1974. Nissan. With 10 tractor heads, formed part of $7 million package.
Trucks (120-ton, off-highway, mining)	14	1974. Wabco (US). Valued at $7 million.
Trucks (Dump trucks)		1975. Isuzu. Part of a $3.4 million package. Shipment in September 1975.

to little more than 3,500 in 1974, orders for other types of construction equipment rose considerably from levels recorded in the two preceding years. During 1974, Japanese sales totalled $47 million, excluding trucks, compared with only $1.5 million for all of 1973. The largest increase was in the category of bulldozers where China imported over 1,000, valued at nearly $31 million.

With the continued import of construction equipment over many years, it could be expected that the Chinese would be in the market for the purchase of complete plants for the manufacture of trucks, tractors, and other equipment. To date, however, the Chinese have shown no interest in this prospect.

SECTORAL ANALYSIS

The Chinese Construction Equipment Industry

Organizational control over production of this type of machinery is largely decentralized. Several of the seven Machine Building Ministries are responsible for the manufacture of construction machinery depending on the kinds of equipment involved. For example, road-building machinery may come under the jurisdiction of one ministry, power shovels for open-pit mining under another, trucks and cranes under a third ministry.

Although little is known about the administrative relationship between the Machine Building Ministries and the numerous construction equipment plants, actual production of this machinery is carried out in accordance with the goals set forth by the State Capital Construction Commission (SCCC). The SCCC's determination of these production targets is based on information gathered from discussions held at each operational level (i.e. district, province, and region).

Major construction equipment plants are located primarily in the north. However, Shanghai and Szechwan are also important construction equipment manufacturing centers. Production at these large plants is complemented by output from the numerous other factories scattered throughout China. Every province and autonomous region has at least one plant which assembles and repairs one or more types of construction equipment while also manufacturing parts and accessories. Table 5 lists the major manufacturing facilities and their products.

China's construction equipment sector faces several problems in fulfilling the country's requirements. The industry suffers from insufficient productive capacity and material shortages.

At the present time, China does not have sufficient machine tools necessary for mass producing many of the requisite construction machinery components. Until the late 1960's there was relatively little emphasis on development of the gear cutting and finishing, grinding, and milling machinery sectors of China's machine-building industry. Since 1968, however, the PRC has undertaken to expand its machine tool industry and to help accomplish this has imported considerable amounts of metalworking equipment each year. Last year China contracted for over $8 million of automotive gear cutting equipment from an American firm. Some of the gears produced on this machinery will be used in construction equipment. China's machine tool industry will have to continue to develop and supply the required machine tools to the construction equipment sector if a concomitant rise in production levels of construction equipment is to be realized.

Another major problem concerns the allocation of materials of construction to the different producers. Construction equipment producers must compete with defense related industries, with power generating equipment producers, and with others for funds and materials. Supply problems appear particularly acute in the area of alloy steels. Such competition appears to have placed some constraints on the production of construction machinery.

In addition, the Chinese have difficulty in producing the special rubbers and plastics used in the development of hydraulic systems. Until they can acquire the necessary technology, progress in this area will be slow.

While the limitations in these three areas may affect China's ability to produce construction equipment in sufficient quantities, overall domestic production of this machinery will continue to grow during the next 5 to 10 years. The extent to which it grows will depend on the priority accorded the construction equipment sector.

Bulldozers and Tractors

The Chinese have concentrated substantial amounts of manpower and other resources on the development and production of tractors and bulldozers because of their adaptability to both agricultural and industrial earthwork. This equipment is generally of the diesel type, hydraulically operated, and ranges from the very small 24 hp to the large (12 ton) 160 hp. Some models and their specifications are shown in Table 6.

Tractors are manufactured on the local level for use primarily in agriculture. They fall in the small 24 hp (16.8 kW) to medium 80 hp (56 kW) range. They are frequently modified for other uses, e.g., road maintenance (probably scraping) by the addition of towed scraper blade, ripper, or crane attachments, depending on the job requirement.

The Chinese also serially manufacture bulldozers of the 100 to 160 hp (70 to 112 kW) size which are used for construction rather than agriculture. A few 300 hp (210 kW) bulldozers have been trial-manufactured in China.

While numbers of bulldozers produced is unknown, they are produced in smaller numbers than

Table 5.—Selected Plants in the PRC Producing Construction Equipment

Plants and Location	*Types of Equipment Produced*
Bulldozers	
Amoy Engineering Plant in Hsia-Men, Fukien Province	Assembles complete bulldozers, mining machinery, other construction equipment.
Anshan Tractor Plant, Liaoning Province	Bulldozers
Ch'eng-tu Hung-ch'i Machinery and Equipment Plant, Szechwan Province	Bulldozers; mobile cranes; excavators and shovel loaders
Loyang Tractor Plant, Honan Province*	Bulldozers, other construction equipment.
Shanghai (P'eng-p'u) Machinery and Equipment Plant	Bulldozers
Tientsin Construction Machinery Plant*	Manufactures the I-Shan-60 model bulldozer.
Excavating Equipment	
Fushun Excavating Machinery Plant, Liaoning Province*	Among civil engineering and construction equipment, produces excavators including 1 to 4 m.^{3} shovel models.
Hsia-Men General Engineering Plant, Fukien Province	Trial produced shovel loaders; also makes mining drills and cement mixers. This is the same plant as the Hsia-men Mining Machinery Plant.
Ch'eng-tu Hung-ch'i Machinery and Equipment Plant, Szechwan Province*	Serially produces several kinds of construction equipment, including excavators.
Kwang-chou Construction Machinery Plant, Kwangtung Province	Serially produces truck-mounted excavators, model W70-1.
Shanghai Construction Machinery Plant*	Manufactures construction equipment including excavators, road rollers, and power shovels.
Shanghai Crane and Transportation Company	Manufactures trenchers and cranes.
Sian Municipal Transportation Company, Shensi Province	Serially produces excavator models W6-40 and XW70.
Cranes	
Ch'ang-chiang Crane Plant, Szechwan Province*	Serially manufacturers 5, 6, 7, and 16-ton truck mounted cranes. Trial produced 32-ton truck crane, China's largest
Ch'eng-tu Hung-ch'i Machinery and Equipment Plant, Szechwan Province*	Serially makes mobile cranes.
Shanghai Construction Machinery Plant	Manufactures a variety of equipment including a 25-ton crane.
Shanghai Crane and Transportation Company*	Manufactures truck cranes and trucks.
Tientsin Crane Plant	Produces cranes and crane parts.
Shovel Loaders	
Ch'eng-tu Hung-ch'i Machinery and Equipment Plant, Szechwan Province*	Produces shovel loaders.
Tsinghai General Machinery Plant, Tsinghai Province	Produces a shovel loader of 8.25 m.^{3} for mines.
Liu-chou Construction Machinery Plant, Kwangsi Province	Produces a 2.7 m.^{3} loader.
Tientsin Crane Plant	Produces a 1.7 m.^{3} loader.
Tientsin Municipal Transportation Company	Manufactures shovel loaders, model #7015, Z4-4, and JZ-25.
T'ai-yuan Mining Machinery and Equipment Plant, Shansi Province*	Major manufacturer of equipment; makes 4 to 8 m.^{3} shovel loaders.
Dump Trucks**	
Tsingtao Motor Vehicle Manufacturing and Parts Plant, Shantung Province	Produces the Yellow River brand truck, model QD351.
Nan-yang Motor Vehicle Plant, Honan Province	Manufactures the Nan-yang brand truck, model 351.
Shanghai Cargo Truck Plant	Manufactures the Communication brand truck, model SH361 and the Shanghai brand truck, model SH380.
Szu-p'ing Municipal Machinery Plant, Kirin Province	Manufactures the Liberation brand truck, model CA340.
Road Building Equipment	
Ch'eng-tu Hung-ch'i Machinery and Equipment Plant, Szechwan Province*	Makes scrapers.
Loyang Construction Machinery Plant, Honan Province*	Produces rollers and graders (10 to 12 tons).
Shanghai Construction Machinery Plant*	Produces 12 to 15-ton rollers.
Air Compressors	
Lanchow Petrochemical and Machinery Plant, Kansu Province	Serially manufactures air compressors.
Pangpu Air Compressor Plant, Anhwei Province*	A major supplier of air compressors, produced the S-10/150 air compressor.
Shan-t'ou Machinery Plant, Kwangtung Province	Produces air compressors.
Wu-hsi Compressor Plant, Kiangsu Province*	Produces 1/10 of PRC's annual output of compressors. Manufactures air compressors for ore mining, petroleum, coal and chemical industries.
T'ai-yuan Mining Machinery and Equipment Plant, Shansi Province*	A major manufacturer of compressors and other heavy equipment.
Concrete Mixers	
Peking #1 Construction Elements Plant	Manufactures concrete mixers.
Other Construction Equipment	
Shanghai Crane and Transportation Machinery Plant*	Produces T-1 bucket trencher.

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* Major producer within each category

** All are major producers of trucks

the tractors. It is estimated that 1,000 100 hp (70kW) bulldozers were built in 1973. Since 1969, little mention has been made of production of the larger 160 hp. (112 kW) type bulldozers.

Parts and attachments for all of the above are normally provided by local and provincial machinery repair shops. It is possible, however, that some parts from imported machines are used for repairing similar Chinese equipment.

While all of these machines have contributed greatly to China's agricultural growth, Chinese equipment lags considerably behind similar equipment from the United States, Japan and Western Europe both as to scale and the employment of the latest technology. The lag in size of units produced is evidenced by the fact that the largest bulldozer serially produced in China is the 160 hp (112 kW) model. This machine is basically similar to the Caterpillar D-7 series, which enjoyed widespread use in the United States beginning in the 1940's.

Table 6.—Bulldozers and Tractors Manufactured in the PRC

(Selected Models with Specifications)[1]

Model	*Horse-power*	*Tractive Force*	*Travel Speed*	*Manufacturing Plant*	*Production Begun*	*Use*
Ch'ang-ch'un 40 (wheel type)	28 hp.			Kirin Road Machinery and Manufacturing Plant	1973-1974	Road Maintenance
Tung Fang Hung 54	54 hp.	2.8 tons		Loyang Tractor Plant	1963	Agriculture and other earthwork, with attachments
D 6154	54 hp.				1970	Multipurpose, with attachments
Tung Fang Hung 60T-1	60 hp.	9-15 tons	4 gears 3.29-8.09 km/hr.	Loyang Tractor Plant		Agriculture and other earthwork, with attachments
Tung Fang Hung 75	75 hp.	4.3 tons	4 gears	Loyang Tractor Plant		Agriculture and other earthwork, with attachments
I—Shan—80	80 hp.			Anshan Tractor Plant		Agriculture
Tung Fang Hung T3-100	100 hp.	9-15 tons	5 gears 2.36-10.13 km/hr.	Loyang Tractor Plant		Agriculture and other earthwork, with attachments
I—Shan—160	160 hp.			Tientsin Construction Mach. Plant	1969	Earthwork in large scale construction projects
Tung Fang Hung 160	160 hp.			Loyang Tractor Plant	1965	Earthwork

[1] Unless otherwise indicated, all are diesel powered, crawler type, hydraulically operated.

Excavating Equipment

Chinese excavating equipment, including power shovels, draglines and dredgers, generally falls into the small to medium-size range relative to Western units. Moreover, model types are not as varied. Nevertheless, production has shown considerable progress in response to China's needs. Selected models and their specifications are shown in Table 7.

Most of the power shovels are diesel powered and hydraulically operated although there are some steam powered and cable operated machines still being built in China. Many of these power shovels, especially the cable operated ones, are based on Soviet and Eastern European models sold to China prior to 1960.

The predominant bucket size is usually 0.5 to 1 yd.^{3} (0.4 to 0.8 m.^{3}). Small by American standards, shovels with this bucket capacity have been used in China not only in construction of buildings, but also on larger projects such as dams and open pit mining where up to 26 yd.^{3} (20 m.^{3}) shovels may be found in operation in Western countries. Shovels with greater than 5.2 yd.^{3} (4 m.^{3}) bucket capacity have not yet been built in China, even on a trial basis.

Many of the shovels are convertible to cranes or draglines with the proper attachments. These convertible shovels are the only known domestically manufactured draglines in China.

The 6-ton "Peking" digger loader is a typical example of a Chinese backhoe with front-end loader. Maximum digging depth is 13 ft. (4m) and maximum digger bucket lift height is 10.5 ft. (3.1m) compared to the maximum loader bucket lift height of 8 ft. (2.4m).

Dredgers

In spite of the fact that port improvement is currently a primary concern to the Chinese, there are very few dredgers being built in China. The first dredger, manufactured in the 1950's, is a suction dredger 100 ft. (30m) long and 30 ft. (9m) wide, with a displacement of 360 tons. It can clear 3,280 ft.^{3} (95.4 m.^{3}) of mud an hour. The suction pipe is steam-pump driven and the end is equipped with a four-vaned rotary cutter. A more recent dredger, built in the 1960's, is actually a dragline equipped with a 5.2 yd.^{3} (4 m.^{3}) bucket. It is primarily used for excavating riverbeds.

Cranes

Of all categories of PRC construction equipment, mobile and stationary cranes offer the greatest variety of sizes and models, ranging from 1-ton truck cranes to a 500-ton floating crane.

In general, Chinese cranes differ from machines manufactured in the U.S., Japan and Western Eur-

Table 7.—Excavating Equipment Manufactured in the PRC

(Selected Models with Specifications)[1]

Model	*Horse power*	*Weight (metric tons)*	*Bucket Capacity*	*Boom Length*	*Machine Dimensions*	*Tractive Force (metric tons)*	*Lift Capacity (metric tons)*	*Manufacturing Plant*	*Other*
Unknown			1 cu.m. (1.3 yd.^{3})					Fushun Excavating Machinery Plant	
Unkown[2] Electric (crawler type)			4 cu.m. (5.2 yd.^{3})						
Peking DiggerLoader (wheel type)	55	5.8	Dig Bucket 0.15-0.20 m^3 (0.2-0.26 yd.^{3}) Load Bucket 0.6 m^3 (0.78 yd ^{3})		Overall Length: 7.68 m.				
W 70-1 (wheel type)		9	Clamshell Bucket 0.5 m^3 (0.65 yd.^{3})		6.7m. long 2.5m. wide 3.2m. high		3	Kwangchow Municipal Transport Company	
W-1001 Diesel, Cable (crawler type)	120	50	1.0 m^3 (1.3 yd.^{3})	Shovel: 6.8 m. Dragline: 1.3/1.6 m. Crane: 13-23m.		15.9	15 (as crane)		With attachments can convert to dragline or crane
W-1002 Electric, Cable (crawler type)	85 Kilowatt	50	1.0 m^3 (1.3 yd.^{3})			15.9	15 (as crane)		With attachments can convert to dragline or crane
W6-40 (wheel type)		7.9	Load.-0.4m^3 (0.5 yd^3) Dig.-(0.3 yd.^{3}) Clamshell 0.4m^3 (0.5 yd.^{3})		6m. long 2.3m. wide 3.3m. high		3	Shanghai Municipal Transport Co.	With three attachments; loader, digger, clamshell bucket
XW70 (3-wheel type)		10.3	Load.-0.7m^3 (0.9 yd.^{3}) Dig.-0.3m^3 (0.4 yd.^{3}) Clamshell 0.8m^3 (1 yd)		6.4m. long 2.5m. wide 3.6m. high			Sian Municipal Transport Co.	With three attachments; loader, digger, clamshell bucket

[1] Unless otherwise specified all are hydraulic, serially produced. For more details on these machines see "Highway and Postal Section, Vol. 11" of *Loading and Unloading Facilities in Communications Departments*, JPRS L/5498-2, U.S. Joint Publications Research Service, Washington, D.C., November 1975.

[2] Not serially produced.

ope in size and use of hydraulics. They are generally characterized by smaller size and lift capacity, and most are cable operated. In most other aspects, they are similar to their Western and Japanese counterparts. Mobile cranes, shown in Table 8, comprise the largest subgroup.

Other mobile cranes with substantially larger lift capabilities than those listed in Table 8 are being manufactured. However, they are not truck cranes but are built primarily for railway and port use. Most of them run on rails and are cable operated. The largest is a 100-ton hydraulic crane with a 25-ton secondary hook. Other cranes in this category are the 5, 6, 10, 15, 16, 45, and 60-ton models.

Stationary and floating cranes are an important component of China's construction equipment industry. Because of the variance in size and lift capacity, most are custom-made to meet specific requirements, for example the 500-ton crane at Tientsin.

In 1973, four self-climb tower cranes were manufactured in Peking. Utilizing hydraulic action and silicon-controlled speed regulators, the cranes have a maximum lift capacity of 10 tons and a maximum lift height of 528 ft. (160m). Other tower cranes are found on construction projects in China.

The three largest models of floating cranes were manufactured specifically for port construction. The smallest of these models, the 100-ton crane, has been built only twice, for use at Shanghai and for use in Liaoning Province at Talien. Tientsin's floating crane in the new port of Hsinkang has a lift capacity of 150 tons. The largest of the models, a 500-ton unit, was produced at Tientsin in July 1974 and is the first of its kind in China.

Shovel Loaders

PRC-built shovel loaders have shown considerable growth and diversification since 1950. Generally, older design, smaller sizes, and fewer numbers of each model produced distinguish the Chinese-built machines from those manufactured in the United States, Japan, and Western Europe. Table 9 lists models and specifications.

One of the most noteworthy characteristics of the smaller machines is their versatility. In addition to excavating and loading on capital construction proj-

Table 8.—Mobile Cranes Manufactured in the PRC

(Selected Models with Specifications)[1]

Model	*Type*	*Max. Boom Length (meters)*	*Max. Lift Capacity (metric tons)*	*Max. Lift Height (meters)*	*Weight (metric tons)*	*Machine Dimensions*	*Manufacturing Plant*	*Other*
1-Ton	Hydraulic truck crane		1		5.1	4.0m. long 2.0m. wide 2.9m. high		
YSD-150	Hydraulic truck crane	4.6	1.5	6.5	5.2		Kwangchow Municipal Transport Company	Truck body is Liberation brand.
SH-141 (Engine)	Hydraulic truck crane		3		7.6	7.5m. long 2.4m. wide 3.5m. high		
T-110	Cable operated truck crane	6.3	3		7.3	9.1m. long 3.4m. high		
SH-141 (Engine)	Cable operated truck crane	6.2			7.9	8.5m. long 2.4m. wide 3.7m. high	Shanghai Municipal Transport Company	
SH-141 (Engine)	Cable operated truck crane	7	3	9.6	9	12.0m. long 2.5m. wide 4.0m. high		88hp.
6120 (Engine)	Cable operated truck crane		5-20		24	5.7m. long 3.2m. wide 3.5m. high	Honan Municipal Transport Company	160hp., 2,000rpm.
SH-141 (Engine)	Cable operated truck crane		3		7	7.8m. long 2.3m. wide 3.2m. high	Shanghai Municipal Transport Company	
QL5	Wheel type cable operated crane	12	5	11		4.5m. long 2.7m. wide 3.7m. high		Production began in 1972
GX-67N	Wheel type cable operated crane	15	7.5	14.8	17	6.6m. long 2.9m. wide 3.9m. high	Shanghai Port Equipment Bureau	
4135 (Engine)	Crawler type cable operated crane	10	8	10		4.6m. long 3.0m. wide 3.7m. high	Shenyang Railway Bureau	80hp. (also make a 6-ton model) Trial produced-1968
Q161	Wheel type cable operated crane	15	16	13.2	23	5.5m. long 3.2m. wide 3.5m. high	Shanghai Port Equipment Bureau	Trial produced-1969 Serial production 1970
HG-10	Wheel type cable operated crane	16	16	15.7	23.5		Shanghai Port Equipment Bureau	Serial production 1970 Modified in 1972
Unknown	Hydraulic truck crane		32				Ch'ang-Chiang Crane Plant (szechwan)	largest domestically-built crane of this type in the PRC.

[1] Unless otherwise specified all are serially produced. For more details on these machines see *Loading and Unloading Facilities in Communications Departments, Vol. I, II, III;* JPRS L/5498 1-3, U.S. Joint Publications Research Service, Washington, D.C., November 1975.

ects such as highways, dams, mines and building construction, they can be used for agricultural earthwork. This adaptability may account for their dominance in this category.

The largest rock loader with 10.7 yd.^{3} (8.25 m.^{3}) shovel is not believed to be serially manufactured. Since its initial manufacture in 1965 at the Tsinghai General Machinery Plant only one other reference has been made to it or another machine like it. Unlike the smaller types of equipment discussed, the rock loader has been designed strictly for loading rocks at mining sites.

Parts and attachments for this machinery, as with the other types discussed, are produced by local plants and supplemented by imports when necessary.

Dump Trucks

The truck producing sector of China's machine building industry, begun in 1956, has produced an estimated 580,000 units. Most of the dry cargo vehicles built in China today are of the 3½ to 10 ton size, are gasoline-driven, and are primarily used for transporting men and equipment. The 4-ton "Liberation" (Chieh-fang) CA 10 model, probably representing 80% of China's total truck production, is based on a Soviet truck design which in turn was a copy of an American truck sent to the U.S.S.R. during World War II.

China does produce dump trucks, including diesel-powered dump trucks in the 7 to 15 ton range. These vehicles are built specifically for use on construction projects, although they can be diverted for other transportation jobs. An estimated 3,000 trucks of this size are produced annually. See Table 10 for selected models of trucks.

In 1971 China began production of the 32-ton Shanghai SH380, its largest dump truck. Indications are that in spite of a growing need for vehicles of this and even greater capacity, only about 100 of the SH380 are being produced annually.

Table 9.—Shovel Loaders Manufactured in the PRC

(Selected Models and Specifications)[1]

Model	*Type*	*Machine Weight (metric tons)*	*Shovel Capacity*	*Lift Capacity (metric tons)*	*Lift Height*	*Machine Dimensions*	*Manufacturing Plant*	*Other*
0.5 cu.m.	Hydraulic	4.2	0.5 m^3 (0.65 yd. ^{3})	1.2	2.2m.	4.2m. long 1.3m. wide 2.4m. high	Shanghai Municipal Transport Company	With forklift attachment
#7015	Hydraulic	7.0	0.82m^3 (1.07 yd.)^3	2.05	2.4m.	5.6m. long 2.0m. wide 2.75m. high	Tientsin Municipal Transport Company	
A83-17B	Hydraulic	5.9	0.8-1m^3 (1-1.3 yd.^{3})	1.7	2.5m.	5.4m. long 2.2m. wide 2.6m.high	Peking Municipal Transport Company	
Red Flag D632	Hydraulic	6.3	1m^3 (1.3 yd.^{3})	1.7	4.2m.	5.5m. long 2.3m. wide 2.7m. high		
DC-17	Hydraulic	6.5	1m^3 (1.3 yd.^{3})	1.7	2.5m.	5.1m. long 2.2m. wide 2.5m. high	Shanghai Municipal Transport Company	
YDC-20	Hydraulic	5.8	1m^3 (1.3 yd.^{3})	2	4m.	5.5m. long 2.2m. wide 2.3m. high	Shanghai Municipal Transport Company	
Z4-4	Hydraulic	6.9	1m^3 (1.3 yd.^{3})	2	2.3m.	5.6m. long 2.2m. wide 2.8m. high	Tientsin Municipal Transport Company	145hp., 3000rpm.
JZ 25	Hydraulic, Articulated Frame	8.25	1-1/4-1-1/2m^3 (1-2/3-2 yd.^{3})	2.5		6.4m. long 2.1m. wide 2.2m. high	Tientsin Municipal Transport Company	95hp., 2800rpm. (maxium tractive power, 5.5 tons)
Z435	Hydraulic		1.7m^3 (2.2 yd.^{3})	5.9				
2.7 m^3	Hydraulic		2.7m^3 (3-1/2 yd.^{3})	5			Liu-chou Construction and Machine Plant	220hp. (with accessories can be used for towing, bulldozing, excavating, earth-loosening and lifting)
8.25 m^3*	Hydraulic		8-1/4m^3 (10.7 yd.^{3})					

* Not serially produced.

[1] Unless otherwise specified, all are serially produced, wheel type. For more details on these machines see "Highway and Postal Section, Vol. II" of *Loading and Unloading Facilities in Communications Departments,* JPRS L/5498-2, U.S. Joint Publications Research Service, Washington, D.C., November 1975.

Table 10.—Dump Trucks Manufactured in the PRC

(Selected Models and Specifications)[1]

Model	*Curb Weight (metric tons)*	*Payload (metric tons)*	*Engine*	*Manufacturing Plant*
Liberation (Chieh-fang) CA-340	4.2	3.5		Szu-p'ing Municipal Machinery Plant
Nan-Yang 351	7.0	7	Diesel 160 hp. 2000 rpm	Nan-yang Motor Vehicle Plant
Yellow River (Huang-Ho) QD-351	7.6	7	Diesel 160 hp.	Tsingtao Motor Vehicle Manufacturing and Parts Plant
Communication (Chiao-t'ung) SH-361	13	15	Diesel 6 cyl. 220 hp. 2200 rpm.	Shanghai Cargo Vehicle Plant
Shanghai SH-380	22	32	Diesel 12 cyl. 400 hp. 2000 rpm	Shanghai Cargo Vehicle Plant

[1] All are serially produced. For more details on these machines see "Technical Handbook for PRC Motor Vehicles" of *Translations on the People's Republic of China, No. 243,* JPRS 60262, U.S. Joint Publications Research Service, Washington, D.C., October 12, 1973.

Roadbuilding Equipment

Since the founding of the People's Republic, roadbuilding has been assigned a relatively high priority in China's overall development program. In view of this, it is interesting to note that only one type of motorgrader is serially produced; the only Chinese-built self-propelled scraper is 23 ft. (7 m) long with 3 yd.^{3} (2.3 m^3) capacity; and the only spreader known to be currently in production is mounted on a Chieh-fang truck chassis and capable of covering 3 to 12 mph (5 to 20 km/hr). More is known about PRC-built road rollers or compactors. Selected models and specifications of road rollers are listed in Table 11.

All of the compactors listed in Table 11 are serially manufactured. Some vibratory models are made. All the compactors are self-propelled and diesel-powered. The 6 to 8 and 8 to 10 ton models are designed primarily for use in paving gravel roads, and are suitable for initial compaction of hot laid asphalt. With four forward and four reverse speeds, they have a travelling speed of 1.1 to 8.6 mph (1.89 to 14.3 km/hr). Both front and rear rolls can be water or sand-ballasted.

The larger models, 10 to 15 tons, are better suited for rolling of bituminous surfaces and for jobs such as harbors and dams where high rolling pressures are required. These models are equipped with hydraulically controlled, dry-plate main clutch and forwarding-reversing clutch. Both rolls can be sand-ballasted.

Sheeps foot rollers are serially manufactured in the PRC, but production figures are not available.

Air Compressors

Chinese-built air compressors generally fall into two categories, those which have agricultural and relatively light industrial applications and those which are used in the transportation, construction and other heavy industrial sectors. Table 12 shows selected models and specifications.

The smaller machines, models V and Z, are designed and built for use primarily in agriculture, for example, to power pesticide sprayers, as well as for such jobs as supplying power to paint spray guns, tire inflation and other places where compressed air is required. The intermediate model, the 3W-1.6/10, is designed primarily to supply compressed air for pneumatic tools and machines.

Heavier pneumatic tools and equipment used on road construction, bridge building and mining, however, require a larger, more powerful compressor—

Table 11.—Road Rollers Manufactured in the PRC

(Selected Models and Specifications)

Type	*Weight (metric tons)*	*Roll Dimensions*	*Rolling Pressure (metric tons)*	*Max. Rolling Width*	*Machine Dimensions*	*Other*
2-Wheel Tandem Roller	6-8	Front: Diam.-1.0m. Width-1.1m. Back: Diam.-1.4m. Width-0.5m.	Front: 22-29 Back: 36-48		4.2m. long 1.9m. wide 1.9m. high	40 hp., 1500 rpm.
2-Wheel Tandem Roller	8-10	Front: Diam.-1.0m. Width-1.1m. Back: Diam.-1.4m. Width-0.5m.	Front: 29-36 Back: 48-60		4.2m. long 1.9m. wide 1.9m. high	
3-Wheel Roller	10-12	Front: Diam.-1.02m. Width-1.27m. Back: Diam.-1.5m. Width-0.5m.	Front: 26-w/o ballast 32.2-w/ballast Back: 63.2-w/o ballast 74.5-w/ballast	2.13m.	4.9m. long 2.2m. wide 2.1m. high	2 Cylinder 40 hp. engine 1500 rpm.
3-Wheel Roller	12-15	Front: Diam.-1.1m. Width-1.27m. Back: Diam.-1.75m. Width-0.5m.	Front: 31.5-w/o ballast 39.3-w/ballast Back: 75.4-w/o ballast 94.3-w/ballast	2.13m.	5.3m. long 2.2m. wide 2.1m. high	4 Cylinder 80 hp. engine 1500 rpm.
Pneumatic Tire Roller (8 small tires)	9-16			2.02m.	4.9m. long 2.0m. wide 3.2m. high	

Table 12.—Air Compressors Manufactured in the PRC

(Selected Models and Specifications)

Model	*Type*	*Air Displacement Capacity*	*Discharge Pressure*	*Total Weight*	*Net Weight*	*Dimensions*
V-.01/10	Two-stage	0.1 cu.m^3/min.	1st. stage 2.4kg/cm^2 2nd. stage 10kg/cm^2			
Z-.02/6	Single-stage Vertical	0.02m^3/min.	6kg/cm^2	45kg. (99 lbs.)	10kg. (22 lbs.)	length-0.58m. width -0.32m. height-0.6m.
Z-.05/6	Single-stage Vertical	0.05 m^3/min.	6kg/cm^2	45kg. (99 lbs.)	10kg. (22 lbs.)	length-0.58m. width -0.32m. height-0.6m.
3W-1.6/10	Two-stage	1.6 m^3/min.	Max: 15kg/cm^2 Rated: 10kg/cm^2	164kg. (360.8 lbs.)	125kg. (275 lbs.)	length-1.25m. width -0.82m. height-1.12m.
2W-9/7	Two-stage	9 ±0.45 m^3/min.	7kg/cm^2	3.2mt. (3200kg)		length-4.12m. width -1.84m. height-2.17m.
S-10/150[1]		10 m^3/min.	150kg/cm^2			

[1] Trial-produced

the 2W-9/7. Until recently this machine was China's largest domestically produced air compressor.

Reports in late 1974, however, indicate that an even larger compressor, the S-10/150, has been trial produced for use in oil fields (24 of the model compressor were produced in 1974). This machine was tested successfully at the Shengli and Takang oil fields at subzero temperatures.

Concrete Mixers

Until 1974 there were basically three models of concrete mixers which were being serially produced in China, the C120-1 and the C120-2 models having a capacity of 65 gal. (247 liters) and the C145-4 model at 104 gal. (395 liter) capacity. All are 8 hp. (5.5 kW) motor driven having mixing drum speeds of 18 rpm.

In 1974, the development of a new mixer, probably a concrete mixer with a special lining, was noted. It was also noted that a new concrete mixer, capable of mixing 5 tons of concrete every 2.5 minutes had gone into series production at the Peking #1 Construction Elements Plant.

Other Construction Equipment

There are two types of trenchers currently being serially produced in China. Both are crawler mounted multi-bucket machines. The larger of the two is capable of excavating a trench at the rate of 4,900 ft.^{3}/hr. (140 m^3/hr.) while the smaller has a 1,750 ft.^{3}/hr. (50 m^3/hr.) capacity.

The Chinese do not manufacture pipelayers specifically, but rather modify tractors such as the Tung Fang Hung D6154 by equipping them with a side-boom crane attachment suitable for laying pipes. Pipelayers are also imported by the PRC (see table 4).

Two types of railroad construction equipment are being serially produced in China. One is a machine for laying track on concrete ties. The other is a mechanical gravel layer. No production figures for these machines are known.

MARKET DEVELOPMENT INFORMATION

Decision Making In China

Organization of the construction industry in China is somewhat decentralized with numerous government institutions having jurisdiction over various construction projects.

After a reorganization in late 1974, the Construction Ministry was apparently abolished and the State Capital Construction Commission emerged with overall responsibility for construction activity. However, the various industrial ministries also exercise some authority in the construction sector in that their construction and design units perform the actual construction of certain large industrial projects. For example, port improvement comes under the direction of the Ministry of Communications' Harbor Bureau. Smaller projects are undertaken by the provincial construction bureaus. Jurisdiction over railroad construction is divided between the railway engineering divisions of the People's Liberation Army (PLA) and various civilian engineering bureaus.

Because of this fragmentation of responsibility, it is difficult to assign funding and production planning functions to any one organization with any great degree of accuracy. Policy goals for capital construction are set by five-year plans; more specific targets are developed annually.

The State Capital Construction Commission determines what these targets will be. As stated earlier, its decision is based on information gathered from discussions held at each operational level (i.e. district, province and region). During the discussions, consideration is given to the sources of funds as well as to the number and kinds of project/industries competing for them. Responsibility for production of construction equipment generally follows this same line of decentralization.

In the course of setting annual targets for investment in new construction machinery, the Chinese give careful consideration to maximum utilization of domestic resources. Only after this portion of the planning process is complete and after determining the availability of the required hard currency, will the State Capital Construction Commission authorize purchase requests to be placed before the appropriate foreign trade corporations. They, in turn, proceed to negotiate the purchase of construction equipment from foreign manufacturers.

Selling to China

All external trade of the People's Republic of China is controlled by eight foreign trade corporations (FTC) subordinate to the Ministry of Foreign Trade. The purchase of individual items of construction equipment is under the jurisdiction of Machimpex. The full name and address of this FTC is:

China National Machinery Import and Export Corporation
Erh Li Kou, Hsi Chiao
Peking, People's Republic of China

If the purchase is to be a complete plant for the manufacture of construction machinery, a major addition to a plant, or the technology necessary to the production of major items of such equipment, the transaction will be with Techimport. The full name and address of this FTC is:

China National Technical Import Corporation
Erh Li Kou, Hsi Chiao
Peking, People's Republic of China

It is not necessary to write to individuals at the trade corporations.

Doing business in China involves a considerable amount of time and money from contact to contract. Contact is made by writing Machimpex or Techimport. If the FTC has an order in hand for the equipment being marketed the response may be quick, requesting more information or asking for a visit to Peking for further discussion. If the FTC has no requirement or order in hand, nothing may be heard.

Present during these Peking discussions, in addition to the trade corporation staff, will be representatives from the end-users of the equipment in question. Negotiations are more extensive than is normal in the United States, particularly the technical discussions where the depth has surprised many foreign businessmen. Depending on the urgency for the equipment, its complexity, and the price, negotiations may be expected to last from 6 months up to 2 years in the case of complete plant. It is important to remember that all contracts are with the FTC and not with end-users of the equipment.*

Generally, the Chinese are interested in the newest equipment and the latest technology; American corporations have already sold the latest petrochemical technology to China. Although there is no patent law

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*Additional details on all aspects of trading with the People's Republic of China may be found in the Commerce publication, *Doing Business with China,* OBR 74-49, October 1974.

available to foreign firms in China, the Chinese have shown some willingness on a case by case basis to give contractual assurances to limit the use of the seller's technology within China and to prohibit the reexport of the technology to third countries. It is unlikely that the Chinese will show any interest in equity joint ventures at this time, but they have entered into technical assistance agreements.

In some cases an effective marketing channel is the trade fair. Exhibiting equipment and holding technical symposia offer the possibility of direct contact with end-users. To date, however, there have been no U.S. shows in China although the foreign subsidiaries of American firms have occasionally participated in such fairs. Individual U.S. companies have been able in some half-dozen instances to present in-depth technical symposia in Peking.

Export Administration Controls

U.S. exports to China, the Soviet Union and certain other destinations are subject to controls provided for by The Export Administration Act of 1969, as amended and extended by the Equal Export Opportunity Act of 1972 and the Export Administration Amendments of 1974. One purpose of this legislation is to authorize controls over the export of goods and technology that would contribute to the military potential of these countries so as to jeopardize U.S. national security. The legislation also declares it to be the policy of the United States to encourage trade in non-sensitive items with all nations, including China, with whom we have diplomatic or trading relations.

For detailed information on licensing requirements U.S. exporters should consult the "Export Administration Regulations" and supplementary "Export Administration Bulletins" at any U.S. Department of Commerce field office in most major U.S. cities. Included in the Regulations is the Commodity Control List (CCL); this is the key to determining whether a specific shipment may be exported under general license or whether a validated license will be required. Most construction equipment is in the general license category although certain technical data will require a validated license.

Appendix

ECONOMIC INDICATORS FOR CHINA 1975

March 1975

Key Indicators	1952	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974 (Prelim)
GNP (billion 1973 US $)	67	94	113	107	106	82	93	103	117	134	145	141	142	157	179	190	197	217	223
Population, mid-year (million persons)	570	641	657	672	685	695	704	716	731	747	763	780	798	817	837	857	878	899	920
Per capita GNP (1973 US $)	117	147	172	160	155	118	133	144	160	179	190	180	178	192	214	222	225	241	243
Industrial production index (1957 = 100)	48	100	145	177	184	108	114	137	163	199	231	202	222	265	313	341	371	416	432
Agricultural																			
Grain (million metric tons)	154	185	200	165	160	160	180	185	195	210	215	230	215	220	240	246	240	250	255
Cotton (million metric tons)	1.3	1.6	1.7	1.2	0.9	0.8	1.0	1.2	1.7	1.9	1.8	1.9	1.8	1.8	2.0	2.2	2.1	2.5	2.5
Chemical fertilizers (million metric tons)																			
Supply	0.4	2.1	3.2	3.3	3.6	2.9	4.0	6.6	7.6	10.7	13.2	13.8	15.6	17.9	21.4	24.2	27.6	32.2	30.5
Production	0.2	0.8	1.4	1.9	2.5	1.8	2.8	3.9	5.8	7.5	9.6	8.1	9.5	11.3	14.0	16.8	19.9	24.8	24.8
Imports	0.2	1.3	1.8	1.4	1.1	1.1	1.2	2.7	1.8	3.2	3.6	5.7	6.1	6.6	7.4	7.4	7.7	7.4	5.7
Industrial Production																			
Crude steel (million metric tons	1.35	5.35	11.1	13.4	18.7	8	8	9	10.8	12.5	15	12	14	16	17.8	21	23	25.5	23.8
Coal (million metric tons)	66.5	130.7	230	300	280	170	180	190	204	220	248	190	205	258	310	335	356	377	389
Electric power (billion kilowatt hours)	7.3	19.3	28	42	47	31	30	33	36	42	50	45	50	60	72	86	93	101	108
Crude oil (million metric tons)	0.44	1.46	2.3	3.7	5.5	5.3	5.8	6.4	8.7	10.8	13.9	13.9	15.2	20.3	28.5	36.7	43	54.5	65.3
Cement (million metric tons)	2.86	6.86	10.7	12.3	12.0	8.0	6.9	9.1	10.9	14.8	16.9	14.2	17.4	19.6	19.8	23.0	27.5	29.9	31.6
Machine tools (thousand units)	13.7	28.3	30	35	40	30	25	35	40	45	50	40	45	55	70	75	75	80	N.A.
Trucks (thousand units)	0	7.5	16.0	19.4	15	1	8.4	16.8	20.3	30	43	32	27	60	70	86	100	110	N.A.
Locomotives (units)	20	167	350	533	602	100	25	27	27	50	140	200	240	261	285	205	225	240	N.A.
Freight cars (thousand units)	5.8	7.3	11	17	28	3	4.0	5.9	5.7	6.6	7.5	6.9	8.7	11	12	14	15	16	N.A.
Cotton cloth (billion linear meters)	3.83	5.05	5.7	6.1	4.9	3.3	3.5	4.6	5.1	6.4	6.7	5.5	6.0	6.6	7.5	7.2	7.3	7.6	7.6
Foreign trade (billion current US $)																			
Total	1.89	3.06	3.76	4.29	3.99	3.02	2.68	2.77	3.22	3.88	4.24	3.90	3.76	3.86	4.29	4.72	5.92	9.88	12.6
Exports f.o.b.	0.88	1.62	1.94	2.23	1.96	1.53	1.53	1.57	1.75	2.04	2.21	1.95	1.94	2.03	2.05	2.41	3.08	4.90	5.9
Imports c.i.f.	1.01	1.44	1.82	2.06	2.03	1.49	1.15	1.20	1.47	1.84	2.03	1.95	1.82	1.83	2.24	2.31	2.84	4.98	6.7

Source: US Government (CIA/ER)

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